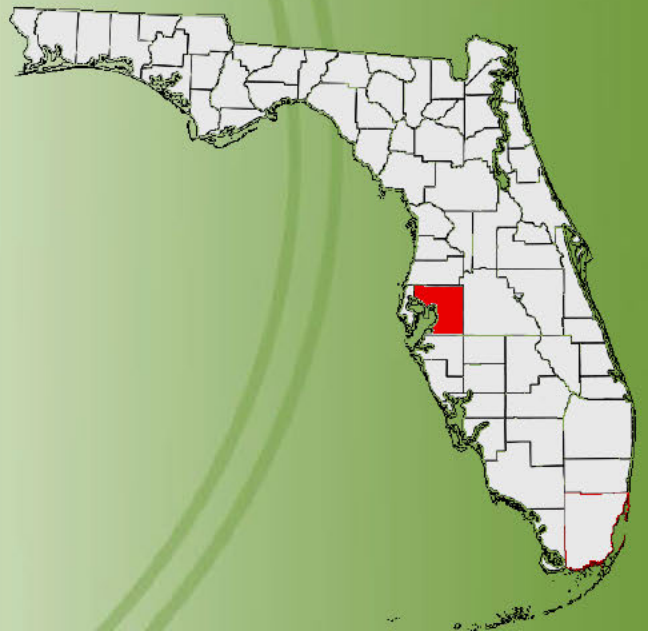
Alaric Groundwater Site, Tampa, Florida

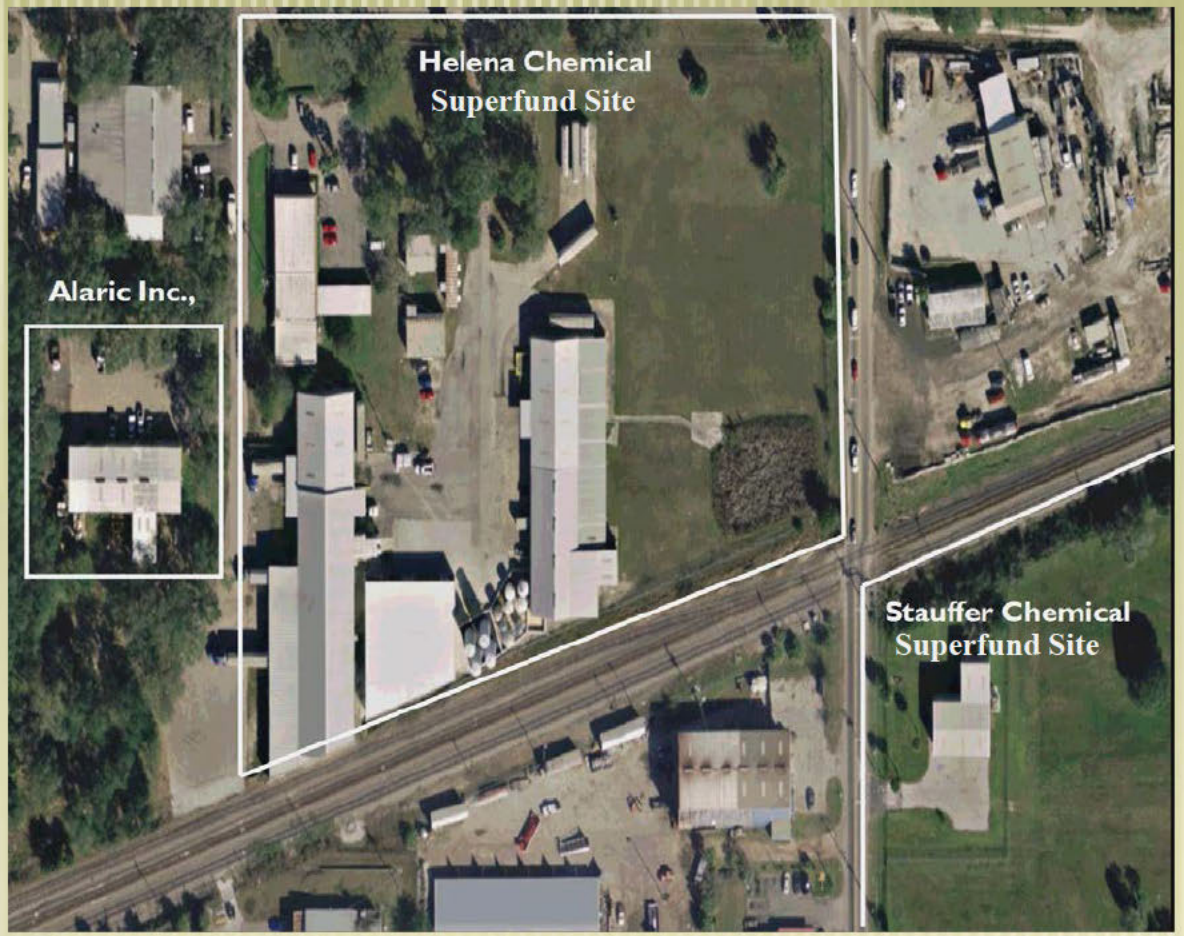
RA Funding Priority Panel – March, 2012



Alaric Groundwater Site, Site Layout

- **Site Layout**
  - 2110 North 71st Street , Tampa, Florida; Hillsborough County
  - ~2.7 Acre lot
  - Sparse wooded lot to the south (Helena)

- **Site Highlights**
  - Orient Park Neighborhood
    - 3 Superfund Sites in Vicinity
    - Zoned Heavy Industrial
    - Sparse Residences
  - VOC DNAPL Present
    - Principal threat
  - 8,875 GW users w/in 4 mi.
    - Municipal supply wells
  - Comingled Plume w/ Helena
    - Pesticides and sulfur
  - High O&M costs: P&T LTRA
    - $220 K/yr.
  - In-Situ Thermal Remediation 2010 Interim ROD Amendment



Alaric Groundwater Site, Environmental Site History

1972 ~ 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010

Building Erected

Hawthorn Custom

Sweeping Corporation of America

1986: PCE Detected

1988: FDEP competes Site Investigation

1995: Helena Final RI/FS

April 2000: Supplemental GW Assessment

November 2000: Phase I RI Reports GW Plume

Dec. 2001 NPL Listing

July 2002: Interim-ROD (ISCO & P&T)

Dec 2007: ISCO Treatment completed

Sept 2008: Phase II RI Report

June 2009: BHHRA

Dec 2009: FS Report

Sept 2010: Interim-ROD Amendment (ISTR)

Interim Action ROD

2002 Interim ROD Remedy

- Removal and replacement of contaminated septic system
- In-situ treatment of contaminated source materials using chemical oxidation;
- Containment of contaminated groundwater using recovery wells;
- Treatment of contaminated ground water using air stripping and carbon adsorption;
- Disposal of treated groundwater; and
- Long-term groundwater monitoring.

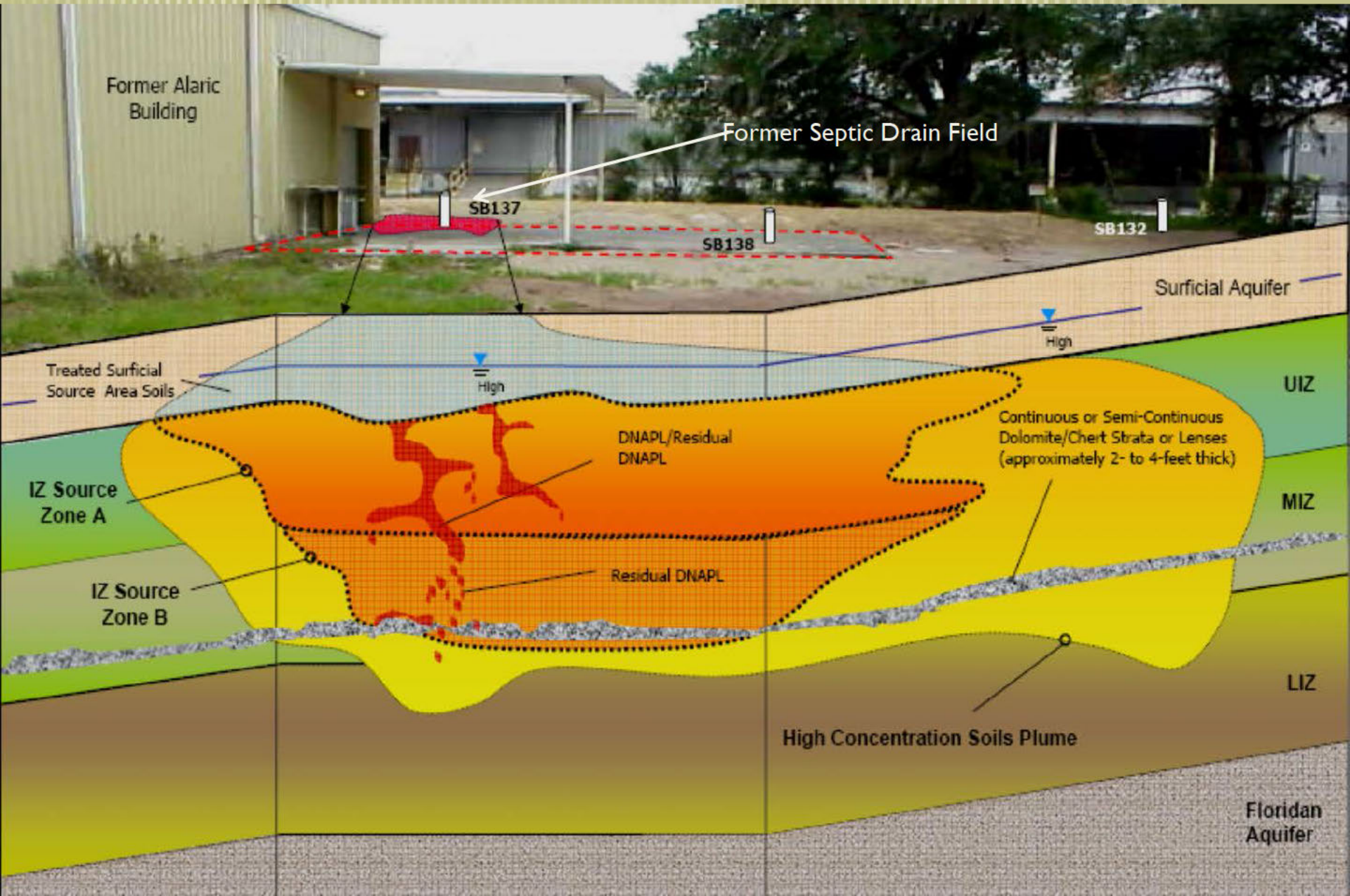
2010 IROD Amendment

- Replaces ISCO treatment of source materials with In-Situ Thermal Remediation
  - Included the option of either
    - Electrical Resistive Heating (ERH) or
    - In-Situ Thermal Desorption (ISTD)

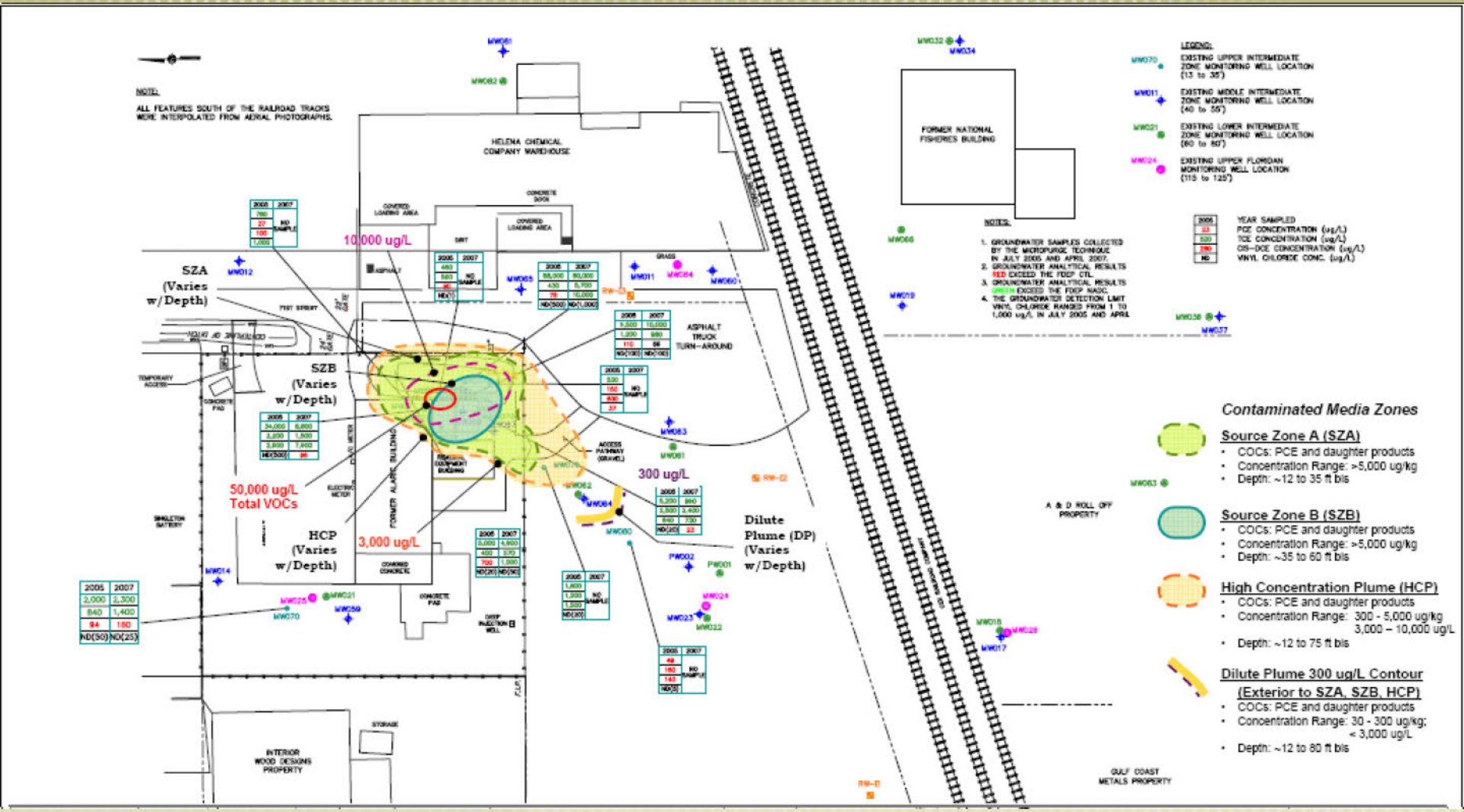
Remedial Action Objectives

1. Prevent or minimize further migration of contaminants to groundwater, by treating and reducing concentrated source materials below the water table to a total chlorinated Volatile Organic Compounds (VOC) concentration ranging from 100 micrograms per kilogram (ug/kg) to 1000 ug/kg
2. Prevent or minimize further migration of contaminants in the soil to the groundwater by removing VOC contaminated soils in the unsaturated zone in the vicinity of the septic system drain field and other related areas for off-site disposal.
3. Prevent or minimize migration of contaminated groundwater plume by collecting, treating, and disposing of VOC contaminated groundwater

Conceptual Site Model



Plain View CSM (UIZ/MIZ/LIZ)

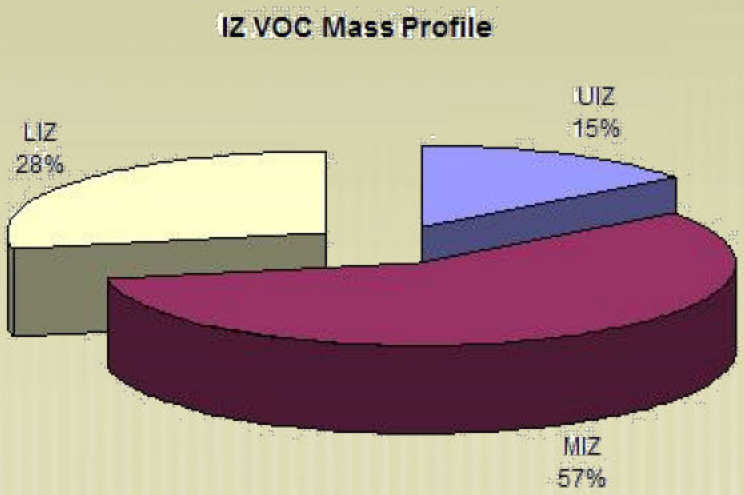


UIZ

Nature and Extent of Contamination

Highlights

- ~ 1,555 lbs.VOC over 9+ Acres in GW and Soil
- DNAPL present in Source Zones down to 60 ft. bls (UIZ & MIZ)
- Comingled Plume with Helena (BHCs + Sulfur)
  - Not addressed under IROD
- Incomplete confining layer
  - Low level concentrations of VOC have been detected in the Upper Floridian aquifer
- Contaminant mobility currently being controlled through P&T system



Contamination Mass Distribution

Surface Soil (0-4 ft. bls.)					
Surficial Aquifer (4-15 ft. bls)		Addressed in IA ROD			
		1.1 Acre			
Low permeability Intermediate Zone (15-85 ft. bls)					
			Source Area Soil VOC mass	VOC Other Soils (lbs)	VOC GW (lbs)
	Upper Intermediate Zone	0.8 Acre VOC Plume	200	0	30.1
	Middle Intermediate Zone	9.1 Acre VOC Plume	47.5	662	178.5
	Lower Intermediate Zone	9 Acre VOC Plume	2.5	373	60.6
		Totals (lbs)	**250**	**1035**	**269**
Floridian Aquifer (85 ft. bls)		low levels of VOC detected in			

LIZ = Lower Intermediate Zone
MIZ = Middle Intermediate Zone
UIZ = Upper Intermediate Zone

Contaminant Concentration Profile

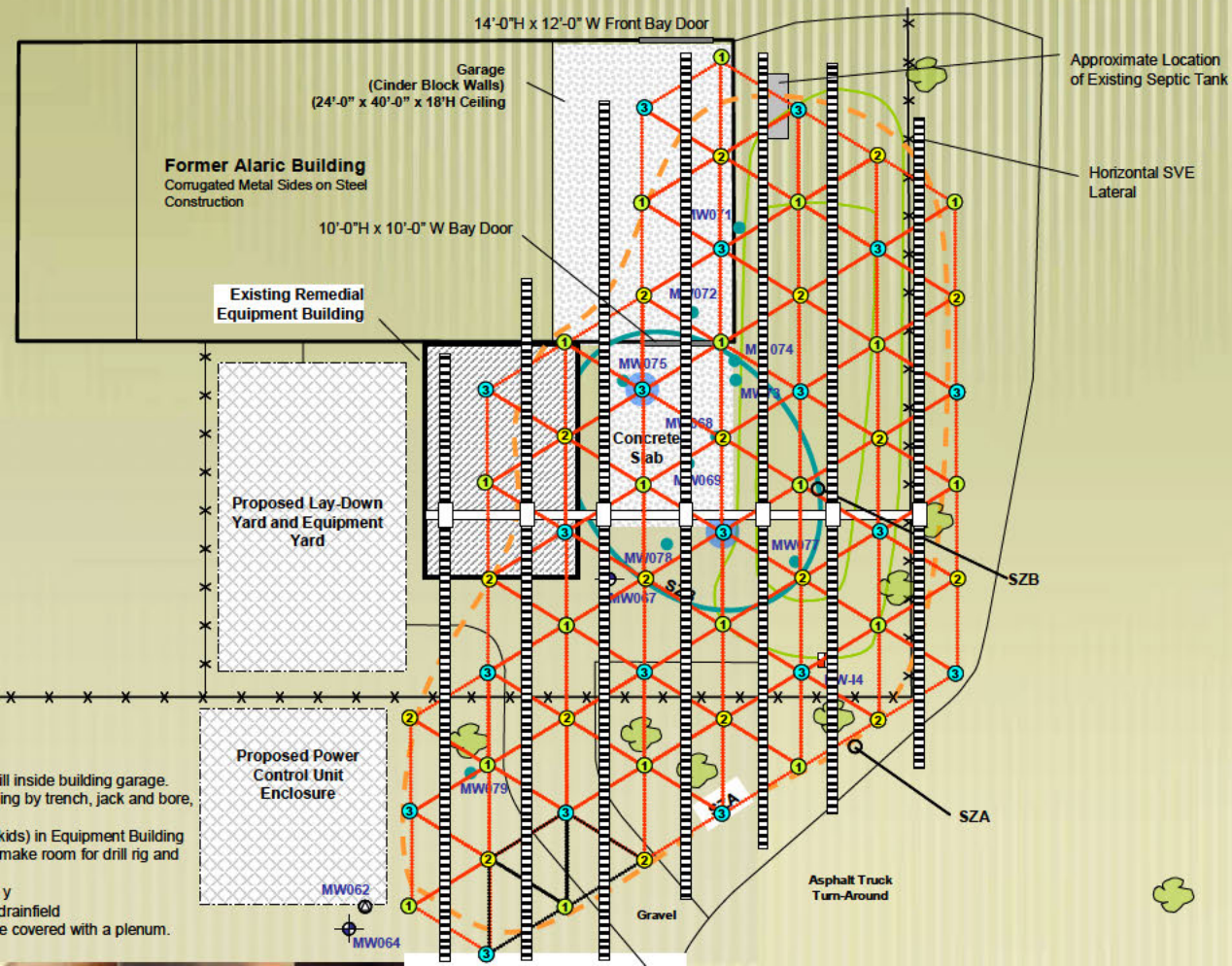
	Contaminant	Max Value (ppb)	MCL (ppb)	Constraint
Surficial Aquifer	Tetrachloroethene (PCE)	12,450	3	FDEP GCTL
	cis-DCE	4,525	70	FDEP GCTL
	Trichloroethene (TCE)	2,730	3	FDEP GCTL
	Vinyl Chloride	422.5	1	FDEP GCTL
Upper Intermediate Zone (UIZ)	Tetrachloroethene (PCE)	100,000	3	FDEP GCTL
	cis-DCE	14,000	70	FDEP GCTL
	Trichloroethene (TCE)	6,700	3	FDEP GCTL
	Vinyl Chloride	1,000	1	FDEP GCTL
Middle Intermediate Zone (MIZ)	Tetrachloroethene (PCE)	87,500	3	FDEP GCTL
	cis-DCE	560	70	FDEP GCTL
	Trichloroethene (TCE)	3,300	3	FDEP GCTL
	Vinyl Chloride	70	1	FDEP GCTL
Lower Intermediate Zone (LIZ)	Tetrachloroethene (PCE)	29,500	3	FDEP GCTL
	cis-DCE	520	70	FDEP GCTL
	Trichloroethene (TCE)	3,000	3	FDEP GCTL
	Vinyl Chloride	0.4	1	FDEP GCTL
Floridian Aquifer	Trichloroethene (TCE)	8.95	3	FDEP GCTL
	Vinyl Chloride	0.23	1	FDEP GCTL

Human Health Risks Assessment

Exposure Scenario vs. Media		Current Worker	Future Worker			Future Resident		
		Current Industrial Worker	Future Industrial Worker	Future Construction Worker	Future Construction Worker (Excavation Scenario)	Future Adult Resident	Future Child Resident	Future Lifetime Resident
Surficial Aquifer	Cancer	3.6E-06	2.6E-02	1.0E-03	7.6E-04	1.4-E01	8.1E-02	2.2E-01
	HI	0.007	743	743	148	2381	5555	NA
UIZ	Cancer	NA	4.8E-02	2.0E-03	NA	2.6E-01	1.5E-01	4.1E-01
	HI	NA	103	103	NA	575	1342	NA
MIZ	Cancer	NA	3.4E-02	1.4E-03	NA	1.8E-01	1.1E-01	2.9E-01
	HI	NA	91	91	NA	504	1176	NA
LIZ	Cancer	NA	1.5E-02	6.0E-04	NA	7.9E-02	4.6E-02	1.2E-01
	HI	NA	64	64	NA	355	828	NA
Floridian Aquifer	Cancer	NA	9.6E-05	3.8E-06	NA	2.6E-04	1.5E-04	4.2E-04
	HI	NA	2	2	NA	5	12	NA

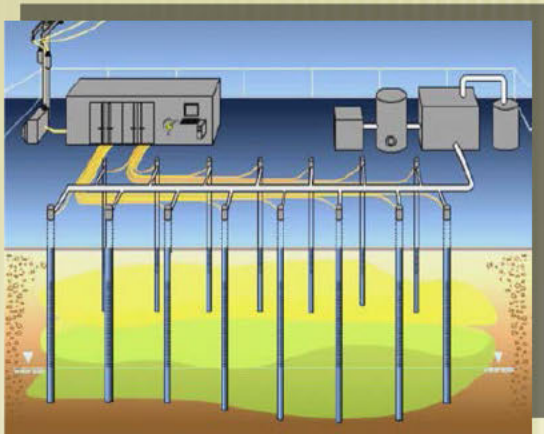
GW ingestion and inhalation main drivers

Source Zone Selected Remedy: Thermal Remediation



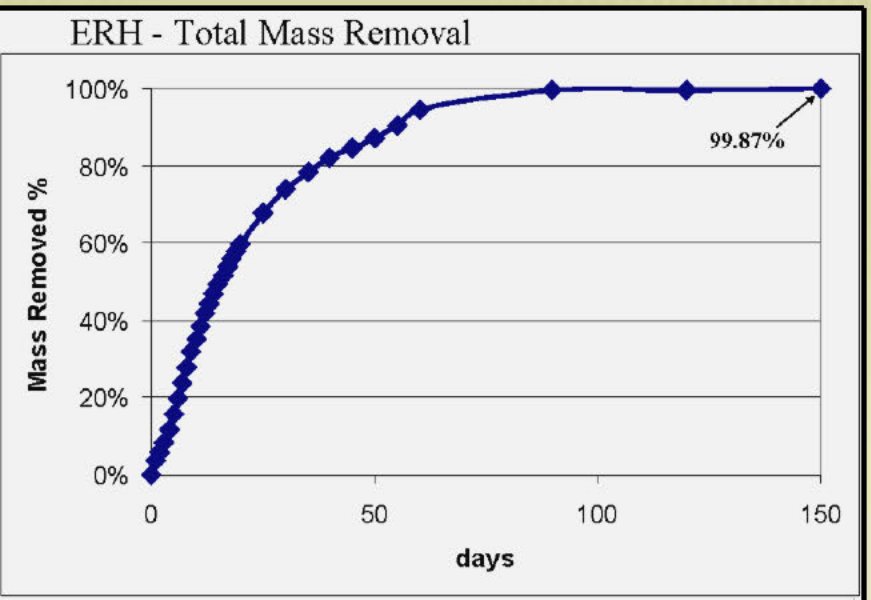
Thermal Remediation Takeaways

- In-situ Thermal Desorption (ISTD) or Electrical Resistive Heating (ERH)
- Heat Transfer to Soil
  - Conduction from direct contact
  - Convection Temperature gradient
- Applied Vacuum to remove VOC
- Housing to clean emissions
- Housing to hold power supply
- ISTD vs. ERH
  - Conduction methodology
    - Heater Wells vs. Electrodes
  - ISTD higher Temperatures
  - Cost ≈ equal
- ERH has been identified as the preferred technology in the RD



Remedy Design Components and Details

- Total Project Duration: 368 Days
- ERH – Total Mass Removal
  - ~99.87%
- Project Cost: $2.3 M +/- 20%
- State Superfund Contract
  - Discussion Initiated
  - State gave concurrence during AROD



Alaric Remedy Primary Components	
Site Development	$103,600
Mobilization (Installation) of equipment)	$722,000
Pilot Testing/System Startup	$102,500
Full Scale Treatment	$1,000,000
Demobilization (Shutdown and Deactivate)	$90,000
Site Restoration	$46,900
Total Alaric Construction Costs	**$2,065,000**
Post Sampling and Analysis Program	$200,000
Total Alaric Site Project Costs	**$2,265,000 +/- 20%**

Demolition and relocation of existing septic tank drain field

Installation of approximately 36 thermal heating wells to a depth of 35 ft bls.

Installation of aboveground vapor phase treatment system

Modification to existing P&T system

Implement In-situ Thermal Remediation

Perform post construction monitoring

Site Restoration

Long-term performance monitoring

Continue ICs to prevent groundwater usage within plume until MCLs are met

Monitoring for a period of three years to assess the impact, and to determine if further action is warranted

Questions / Comments